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Paper March 3d 1828

An

Inaugural Essay,

On the eighth pair of nerves.

For the degree of Doctor of Medicine,

in the University of Pennsylvania,

By

Edward R. Ware of Georgia,

Philadelphia.

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There is nothing more frequently praised than the certainty of the evidence of natural truths. Each writer in his turn thinks his discoveries completely established, and arrays his alledged facts in an apparently resistless phalanx. But almost every one who elicits novelties, is, in spite of his confidence, subjected to controversy and contradiction. His facts are denied, his experiments are refuted, his conclusions declared inadmissible, and his veracity and philosophical honesty called into question. These reflections were suggested by a perusal of the written conflict respecting the influence of the eighth pair of nerves on digestion. The experiments of Wilson Philip illustrative of the influence of the eighth pair of nerves on respiration and digestion, have been subsequently repeated by an English writer (Broughton) and results diametrically opposite declared. In order to satisfy myself

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as to the cause of such discrepancy; and if possible to ascertain the truth, free from all bias or prepossession, I instituted the following course of experiments; assisted by Dr J. K. Finley, and others of my medical friends.

Experiment 1st

After causing two rabbits of the same age and size, to fast for the space of sixteen hours; I gave them as much parsley as they would eat. One of them I set at liberty. In the case of the other I divided, about midway the neck, the nerves of the eighth pair. The division was immediately followed by difficult respiration, soon attended with a croaking noise, and gradually increased until death supervened; which happened in six hours and a half, after the operation. The other rabbit was then killed, and a comparative examination made. The stomach of the one ~~ope-~~

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subjected to the operation, was much distended; the general mass of food had undergone but little change; that part which was in contact with the parietes of the stomach, was altered in colour, and somewhat in consistence, resembling partially digested matter. The central parts retained their natural colour and odour, and resembled finely chopped parsley. The lungs were largely engorged with blood, but did not sink in water. The trachea and air cells contained a frothy fluid.
The stomach of the rabbit not operated on, was hard and contracted, and about half the size of that of the other; that part of digestion confided to the stomach, was apparently completed, for, though all the contents had not passed out at the pylorus; yet what remained was a uniform chymous mass, more compact and dry at the pyloric, than towards the centre or cardiac end. This experiment

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was satisfactory, and conclusive, and was followed by six others of a similar nature all of which gave uniform results.

Experiment 2.d

A half-grown cat was kept without food for twelve hours, and then one ounce and a half of raw beef was given. In fifteen minutes after, I divided the nerves of the eighth pair low down upon the neck. The usual symptoms followed, differing from those of the preceding experiments only in degree; respiration was deep, slow, and laborious, attended with a croaking noise, and apparent efforts to vomit, which continued to increase for ten hours; when from the great distress and prostration, I was induced to kill it. Upon examination no change was perceptible in the food, except in the circumference, which had lost its livid hue, and resembled beef shortly

after being placed in warm water. It had lost nothing in weight. The lungs were engorged with blood; and the trachea filled with frothy fluid, slightly tinged with blood. This experiment was also confirmed by one other.

Experiment 3.d

Having caused two rabbits of the same age and size to fast for about sixteen hours, I allowed them as much cabbage as they could eat; after which I made a section of the eighth pair of nerves in each. The one I set at liberty, the other the hair being shaved on either side, off the region of the stomach, I submitted to the influence of a galvanic trough, containing fifty pair of four inch plates, the intervals being filled with sulphuric acid and water, in the proportion of one of acid to sixty of water. A gentle and uniform

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twitching of the muscles of the trunk ~~was kept~~ was kept up by the occasional addition of acid, for six hours; at the end of which time (the animal being almost exhausted) it was killed by a blow upon the occiput. Examination being made, the stomach was found distended as in our first experiments; the external part of the contents was changed in colour, and somewhat in consistency, so as to resemble a chymous mass; whilst internally, it was as it had been chewed and swallowed. The lungs were engorged, though not so much as usual. During the process, the respiration exhibited the phenomena seen in the other cases. The trachea contained a frothy fluid. This animal eat nothing after the operation, and nothing was found in the oesophagus.
In half an hour (six hours and a half after the operation) the other rabbit died; the stomach and its contents resembled in every

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respect, that of the galvanized rabbit. The lungs were more largely engorged with blood, which constituted the only apparent difference.

Experiment 4.th

A rabbit after fasting was afforded as much parsley as it would eat; when the hair being shaved on the back, near the region of the stomach, and a small plate of tin bound thereon; the eighth pair of nerves were divided, and about a quarter of an inch of the lower section of each coated with tin foil. The tin foil and tin were connected with the opposite poles of the galvanic trough, and a uniform effect kept up for five hours and a half, when the animal died. Its respiration during the process, the state of the stomach, food, lungs, and trachea, differed in no particular from

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those in the immediately preceding experiments.

Experiment 5.th

Two rabbits were caused to fast for about twelve hours, when there was given as much cabbage as they would eat. The one remained in its natural state. In the other the pneumo gastric nerves were divided, and submitted to the galvanic power as in the last experiment, and a uniform effect was kept up for seven hours, when the animal died. Upon examination it was found to differ in no perceptible degree from those in which the nerves had been divided. Whilst the stomach of the healthy rabbit, exhibited the contents diminished in quantity and in a completely chymous ~~m~~ ~~aft~~ state, and in the pyloric end comparatively dry and compact.

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These experiments made with much care and time and labour, serve to show the great caution with which we should receive the accounts of every experimental inquiry. They afford results agreeing with those of Dr. Philip respecting the effect on digestion, by the division of the Par Vagum, for by that section digestion is almost totally arrested; and although they would indicate partial action, it is so slight, that it may be justly attributed to the healthy secretions of the stomach poured out immediately preceding the operation. Although secretion the alledged cause, and, as we believe the primum mobile of chymification, does not cease after the division of these nerves, but on the contrary appears to be augmented; yet, inasmuch as it is incapable of changing food to chyme it must be morbid. Another apparent barrier to chymification is the

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deficiency of action in the muscular coat of the stomach, known from the violent and ineffectual efforts to vomit, symptoms constant and remarkable, particularly in cats; and as proved in those rabbits which were permitted to eat after the operation where food was found in the oesophagus itself. But when we endeavour to substitute the galvanic irritation for that action carried on through continuous nerves, we cannot reach either the facts or conclusions of Philips; Our results are entirely contradictory of his. And we are compelled to acknowledge our belief in the inaccuracy of his galvanic experiments, and stand prepared to deny, that there is yet any good reason for believing in the identity of galvanism and the mysterious principle of life.

Death, in all these cases ~~abundant~~ here related, seems to be caused rather by the

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state of the lungs, than by that of the stomach; for the engorgement, and obstruction in the organ of respiration, put finally an entire stop to the access of air into the bronchial cells, and suffocation ensued.

As I set out in the investigation of a fact, rather than of an opinion, my essay is necessarily short, for a few experiments though of a troublesome and difficult character, furnished me with an adequate result, and gave me no opportunity of creating a lengthened dissertation.

No 60 C.

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very good – & deserving commendation
we are surprised that so many mistakes in
spelling however, occur – especially the
most common word in Medicine – viz
Inflammation –

Passed March 4th. 1828